

# PWR Nozzle Examination

Nozzle Pipe Manipulator (NPM)



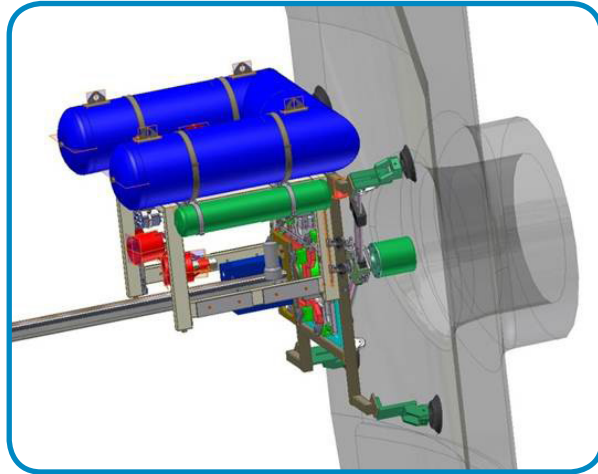
While some full-vessel examination intervals are extending, other nozzle examinations will have more frequent intervals. That's why AREVA offers nozzle-specific examination technology to quickly deliver inspections when full-vessel tools are not required.

## BWR and PWR nozzle capabilities based on long history

- AREVA's long history of BWR nozzle examination technology is now extended to larger PWR Nozzles with enhanced features for simplified nozzle-specific PWR examinations
- NPM is an updated UT inspection system based on the well-vetted smaller BWR nozzle inspection system used by AREVA on EU BWRs for more than ten years

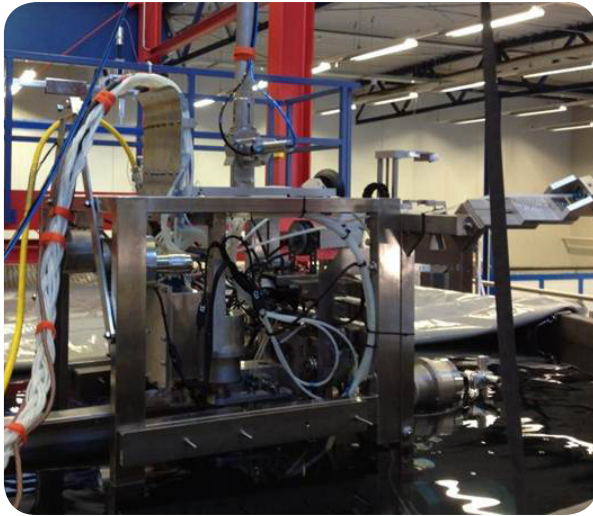
## Enhanced features for simplified nozzle-specific examinations

- Wide range of pipe diameters from 159-850 mm (6.3 – 33.5 in) plus nozzle-shell and nozzle inner radius scans from 400-1450mm (16-57 in)
- On-board field-bus control modules to minimize cables
- Air over-pressure protects electronics and minimizes contaminant transport
- Extensive variety of qualifications including ASME PSI, Swedish, and TUV
- Free-swimming from nozzle-to-nozzle.
- Conventional and Phased-Array UT capability
- UT analysis can compensate for surface geometries



## Features and Benefits

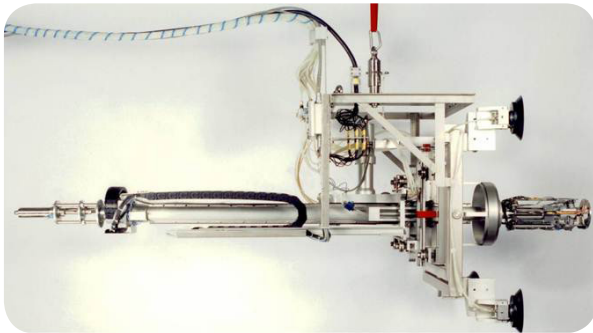
- Nozzle arms extend around nozzle inner radius – **no need for UT relief request**
- Swimming delivery eliminates crane except for entry and exit from the pool
- Simple mechanics and controls maximize reliability and minimize crew size
- Compact size minimizes lay down requirements on refuel floor
- Adaptable to a large range of RV designs (i.e. two-loop to EPR)



*The system may also be deployed without swimming capability. Attachment to the shell uses suction cups, and the central shaft is actively centered before beginning the scan.*



*Floats above the manipulator add buoyancy so the props can swim from nozzle to nozzle without aid of the polar crane.*



*Smaller pipe-diameter version used for German and Scandinavian BWR nozzles.*

➤ **AREVA's NPM tool extends over a wide range of nozzle diameters and can inspect pipe welds as well as nozzle inner-radius areas.**

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